



**Environmental Protection Authority**

GOVERNMENT OF WESTERN AUSTRALIA

**Referral of a Proposal by the Proponent to the Environmental Protection Authority under Section 38(1) of the *Environmental Protection Act 1986*.**

**EPA REFERRAL FORM  
PROPONENT**

**PURPOSE OF THIS FORM**

Section 38(1) of the *Environmental Protection Act 1986* (EP Act) provides that where a development proposal is likely to have a significant effect on the environment, a proponent may refer the proposal to the Environmental Protection Authority (EPA) for a decision on whether or not it requires assessment under the EP Act. This form sets out the information requirements for the referral of a proposal by a proponent.

Proponents are encouraged to familiarise themselves with the EPA's *General Guide on Referral of Proposals* [see Environmental Impact Assessment/Referral of Proposals and Schemes] before completing this form.

A referral under section 38(1) of the EP Act by a proponent to the EPA must be made on this form. A request to the EPA for a declaration under section 39B (derived proposal) must be made on this form. This form will be treated as a referral provided all information required by Part A has been included and all information requested by Part B has been provided to the extent that it is pertinent to the proposal being referred. Referral documents are to be submitted in two formats – hard copy and electronic copy. The electronic copy of the referral will be provided for public comment for a period of 7 days, prior to the EPA making its decision on whether or not to assess the proposal.

**CHECKLIST**

Before you submit this form, please check that you have:

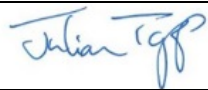
	Yes	No
Completed all the questions in Part A (essential).	✓	
Completed all applicable questions in Part B.	✓	
Included Attachment 1 – location maps.	✓	
Included Attachment 2 – additional document(s) the proponent wishes to provide (if applicable).	✓	
Included Attachment 3 – confidential information (if applicable).		n/a
Enclosed (as Attachment 4) an electronic copy of all referral information, including spatial data and contextual mapping but excluding confidential information.	✓	

Following a review of the information presented in this form, please consider the following question (a response is optional).

Do you consider the proposal requires formal environmental impact assessment?	
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Not sure
If yes, what level of assessment?	
<input type="checkbox"/> Assessment on Proponent Information Review	<input checked="" type="checkbox"/> Public Environmental Review

**PROPONENT DECLARATION** (to be completed by the proponent)

I, Julian Robin Paul TAPP, declare that I am authorised on behalf of Energy and Minerals Australia Limited (being the person responsible for the proposal) to submit this form and further declare that the information contained in this form is true and not misleading.

Signature: 	Name: Julian Tapp
Position: Chief Executive Officer	Company: Energy and Minerals Australia Limited
Date: 13/08/2013	

## PART A - PROPONENT AND PROPOSAL INFORMATION

(All fields of Part A must be completed for this document to be treated as a referral)

### 1 PROPONENT AND PROPOSAL INFORMATION

#### 1.1 Proponent

<b>Name</b>	Energy and Minerals Australia Limited ( <b>EMA</b> )
<b>Joint Venture parties (if applicable)</b>	N/A
<b>Australian Company Number (if applicable)</b>	120 178 949
<b>Postal Address</b> (where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State)	Post Office Box 23 WEST PERTH WA 6872
<b>Key proponent contact for the proposal:</b> <ul style="list-style-type: none"><li>▪ name</li><li>▪ address</li><li>▪ phone</li><li>▪ email</li></ul>	Julian Tapp Energy and Minerals Australia Limited Ground Floor, 25 Richardson Street WEST PERTH WA 6005 +61 (08) 9389 2700 jtapp@eama.com.au
<b>Consultant for the proposal (if applicable):</b> <ul style="list-style-type: none"><li>▪ name</li><li>▪ address</li><li>▪ phone</li><li>▪ email</li></ul>	Colin Woolard Woolard Consulting Pty Ltd PO Box 8068, Angelo Street SOUTH PERTH WA 6151 +61 (08) 9368 5019 colin@woolardconsulting.com.au

#### 1.2 Proposal

<b>Title</b>	<b>Mulga Rock Project</b>
<b>Description</b>	<p>The Mulga Rock Project Area covers an area of 117,800 hectares and is located in the Shire of Menzies, 240 km east-north-east of Kalgoorlie (Figure 1) on the western flank of the Great Victoria Desert. The Project contains four separate deposits – Princess, Ambassador, Emperor and Shogun – on tenure held by Energy and Minerals Australia (<b>EMA</b>). Details of the project tenure and development envelopes for the four mines are shown on Figure 2. The conceptual site layout and disturbance footprint are shown on Figure 3. The Inferred Resource for the Project is 57.3 Mt at 500 ppm U<sub>3</sub>O<sub>8</sub> for 28.3 Kt of contained U<sub>3</sub>O<sub>8</sub>.</p> <p>The Mulga Rock Project encompasses uranium extraction involving:</p> <p>(a) open cut mining (of sandstone and lignite-hosted uranium deposits)</p>

	<p>(b) on-site processing of ore from multiple sites to recover the extracted uranium and process into a uranium concentrate.</p> <p>(c) in-situ leaching (of the deeper sandstone-hosted uranium that is amenable) – but this will be the subject of a separate referral and is contingent on the outcome of further investigations.</p> <p>Annual production of concentrate is expected to ramp up over a two year period to 3 million pounds per year for a mine life which is expected to be in excess of fifteen years. This could require up to 2.5Mt of ore to be mined each year and as much as 40Mtpa of overburden removal.</p> <p>Consideration will also be given to recovering other metals such as the base metals and Rare Earth Elements that are contained within what is a poly-metallic deposit.</p> <p>Road access will be via unsealed existing Shire roads, the recently opened Tropicana Gold Mine access road and mine roads.</p> <p>Cover sequence overburden will initially be placed in a geomorphically oriented waste rock landform. However once sufficient mine void has been developed (and the underlying ore removed for processing), waste rock will then be used to backfill the mined areas. Backfilled areas will be progressively rehabilitated. Similarly, process tailings will initially be stored in an appropriately constructed above-ground tailings storage facility, but once there is sufficient mining void available, the mined out area will be used for tailings deposition prior to final capping and rehabilitation.</p> <p>Initial mining will commence at the deposit known as Princess. This will require around 12 hectares of clearing for the mine and a further 10 hectares for the waste rock landform and topsoil stockpiles. It will also require the construction of a temporary tailings storage facility requiring 23 hectares and an evaporation pond requiring a further 55 hectares. In addition, the processing plant, admin and ROM pad will require 11 hectares and the village 9 hectares. The new airstrip will require around 15 hectares of clearing and around 60 hectares will be required for access and haul roads and miscellaneous disturbance.</p> <p>Process water requirements sourced from the mine dewatering and borefield would be up to 2GL/year. The latter could require up to 50 hectares of clearance with a further 48 hectares for the service corridor.</p>

	<p>Mining will then proceed almost immediately (within one year) to the Ambassador deposit. Eventually (after around seven years) mining will move on to Shogun and then the Emperor deposit and will require the clearance of further areas. The total net amount cleared at any one time is not expected to exceed 1,000 hectares as previously cleared areas will be progressively rehabilitated.</p> <p>Key characteristics of the Proposal are attached as Table 1 with supporting information shown on Figures 1, 2 and 3.</p>
Extent (area) of proposed ground disturbance.	Up to 2,000 hectares of ground disturbance within a development envelope of 8,491 hectares. The overall project area is 117,800 hectares.
Timeframe in which the activity or development is proposed to occur (including start and finish dates where applicable).	Subject to obtaining all appropriate regulatory approvals and necessary financing, construction is expected to start in 2015 with production commencing before end of 2016. Mine life is expected to be in excess of 15 years.
Details of any staging of the proposal.	Initially mining and processing will be centred on the Ambassador and Princess Deposits (see Figure 2). Mining will subsequently be extended to include the Emperor and Shogun deposits.
Is the proposal a strategic proposal?	No
<p>Is the proponent requesting a declaration that the proposal is a derived proposal?</p> <p>If so, provide the following information on the strategic assessment within which the referred proposal was identified:</p> <ul style="list-style-type: none"> <li>▪ title of the strategic assessment; and</li> <li>▪ Ministerial Statement number.</li> </ul>	No
Please indicate whether, and in what way, the proposal is related to other proposals in the region.	The project is not related to other EMA-owned proposals in the region.
Does the proponent own the land on which the proposal is to be established? If not, what other arrangements have been established to access the land?	<p>Current tenure is Unallocated Crown land.</p> <p>Access to the land is enabled through mining tenure – principally M39/1080 (9,523 ha), M39/1081 (3,010 ha) and Miscellaneous Licences L39/193 (31,641 ha) and L39/219 (238.9 ha) granted under the <i>WA Mining Act (1978)</i>.</p> <p>Project Area tenure surrounding the primary mining leases consists of exploration and prospecting licences. Project tenure is beneficially owned by EMA through 100% owned subsidiary Narnoo Mining Pty Ltd.</p> <p>Applications for additional Miscellaneous Licences under the <i>WA Mining Act (1978)</i> will be lodged for infrastructure when development locations are finalised.</p> <p>The Project Area is not located within any registered Native Title claim area.</p>

<p>What is the current land use on the property, and the extent (area in hectares) of the property?</p>	<p>The land under the mining tenements is Unallocated Crown Land.</p> <p>The Project Area covers 1,178 km<sup>2</sup> and the primary land uses are mineral exploration and natural habitat. The Project Area is part of the GVD1 bioregion which covers an area of 54,427 km<sup>2</sup>, is largely unexplored and has elements which are documented as possessing high biodiversity values.</p>
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### 1.3 Location

<p>Name of the shire in which the proposal is located.</p>	<p>Shire of Menzies</p>
<p>For urban areas:</p> <ul style="list-style-type: none"> <li>▪ street address;</li> <li>▪ lot number;</li> <li>▪ suburb; and</li> <li>▪ nearest road intersection.</li> </ul>	<p>N/A</p>
<p>For remote localities:</p> <ul style="list-style-type: none"> <li>▪ nearest town; and</li> <li>▪ distance and direction from that town to the proposal site.</li> </ul>	<p>The nearest residential town is Laverton, located approximately 200 km north-west of the Project Area. Kalgoorlie is the region's primary administrative and commercial centre and is 240 km south-west of Mulga Rock. Access is restricted to 4WD vehicles. Pinjin Station Homestead, located 100 km west of the Project Area, is the nearest residential community.</p>
<p>Electronic copy of spatial data - GIS or CAD, geo-referenced and conforming to the following parameters:</p> <ul style="list-style-type: none"> <li>▪ GIS: polygons representing all activities and named;</li> <li>▪ CAD: simple closed polygons representing all activities and named;</li> <li>▪ datum: GDA94;</li> <li>▪ projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA);</li> <li>▪ format: Arcview shapefile, Arcinfo coverages, Microstation or AutoCAD.</li> </ul>	<p>Enclosed in Attachment 1 are electronic copies of project spatial data as shapefiles.</p>

**Table 1 Key Proposal Characteristics**

<b>Element</b>	<b>Description</b>
<b>Proposal title</b>	<b>Mulga Rock Project</b>
<b>Proponent name</b>	Energy and Minerals Australia Limited (EMA)
<b>Project description</b>	<p>Poly-metallic deposits with commercial grades of contained uranium hosted in carbonaceous material found in both sandstone and lignite zones. Current JORC Resource 28,300 tonnes of U<sub>3</sub>O<sub>8</sub>.</p> <p>This proposal covers the:</p> <ul style="list-style-type: none"> <li>(a) mining of polymetallic ore containing uranium from the Princess, Ambassador, Shogun and Emperor deposits, 240 km east north east of Kalgoorlie in the Shire of Menzies; and</li> <li>(b) construction of open cut mines, waste rock landforms, processing plant, temporary tailings storage, water and power supply, village, airstrip and transport infrastructure.</li> </ul>
<b>Life of project</b>	In excess of fifteen years.
<b>Project timing</b>	<p>Subject to regulatory approvals and financing:</p> <ul style="list-style-type: none"> <li>▪ Construction to commence in 2015;</li> <li>▪ Operations to commence in 2016.</li> </ul>
<b>Physical Elements</b>	
<b>Mining method</b>	<p>Predominantly free-dig open cut mining using excavators and trucks to mine up to 2.5Mtpa of mineralised material and up to 40Mtpa of overburden and interburden. Mine dewatering to allow mining. Water to be used for dust suppression, process use with excess stored in an unlined, 55 hectare evaporation dam(s) or reinjected into the aquifer. No off-site surface water discharge is proposed. The location of mine voids and waste rock landforms and infrastructure is shown on Figure 3.</p>
<b>Processing plant</b>	<p>Processing up to 2.5Mtpa of ore to produce 3 million pounds of uranium oxide concentrate (and some base metal and REE concentrates) using a combination of physical beneficiation, heat, acid leach, and then extraction and precipitation. Process wastes initially to above ground Tailings Storage Facility (TSF).</p>
<b>Development area</b>	<p>The development envelope for the Project covers a total area of 8,491 hectares consisting of a buffer zone of 6,491 hectares and 2,000 hectares of identified infrastructure disturbance. Detailed breakdown of disturbance by element is shown on Figure 3.</p>
<b>Operational Elements</b>	
<b>Water supply and demand</b>	<p>Water supply will be groundwater derived from a combination of mine dewatering and from a local, yet to be confirmed production borefield for a demand of up to 2GL/a. Provisional borefield location is located to the north-east of the Ambassador mine and is shown on Figure 2.</p>

Element	Description
<b>Overburden</b>	Initially used to build a waste rock landform and for construction use. Once sufficient mining void is available, backfilling of overburden into the void will occur. Waste rock disposal sites and disturbance areas are shown on Figure 3.
<b>Tailings disposal</b>	Initially deposited into a 23 hectare above ground tailings storage facility. Once sufficient mine void is available, process waste will be placed back into the base of the mining void and covered with overburden.
<b>Ore transport</b>	Ore from the four mine sites will be transported to the mill for processing on dedicated haul roads. Project area access, corridors and disturbance areas are shown on Figure 3.
<b>Power supply</b>	On-site generation facilities approximate capacity 10MW.
<b>Access to site</b>	Unsealed mine and access roads are linked to the Tropicana Gold Mine access road.
<b>Support infrastructure</b>	Airstrip, accommodation village and waste water treatment facilities, bulk fuel storage, project administration and maintenance buildings.
<b>Workforce</b>	Construction workforce of up to 400 personnel on FIFO roster and domiciled in site accommodation village. This will reduce to an operational workforce of approximately 200.

#### 1.4 Confidential Information

Does the proponent wish to request the EPA to allow any part of the referral information to be treated as confidential?	No
If yes, is confidential information attached as a separate document in hard copy?	N/A

#### 1.5 Government Approvals

Is rezoning of any land required before the proposal can be implemented? If yes, please provide details.	No
Is approval required from any Commonwealth or State Government agency or Local Authority for any part of the proposal? If yes, please complete the table below.	Yes



**Table 2 Required Approvals**

Agency/Authority	Approval required	Application lodged Yes / No	Agency/Local Authority contact(s) for proposal
Environmental Protection Agency (EPA)	This referral is being made to the EPA under Part IV s.38(1) of the <i>Environmental Protection Act (1986)</i>	Yes – this submission	OEPA
<b>WA State Agencies:</b>			
Department of Environment Regulation (DER)	Works Approvals, Prescribed Premises and Native Vegetation Clearing Licences will be required from the DER under Part V of the <i>Environmental Protection Act (1986)</i> and subsidiary regulations	No	To be advised
Department of Parks and Wildlife (DPAW)	Licencing for Fauna/Flora surveys	Current	Licencing Officer - DPAW
Department of Water (DoW)	Additional licence amendments to construct boreholes (26D), develop borefield and to take ground water (5C) will be required from the DoW under the <i>Rights in Water and Irrigation Act (1914)</i>	Yes – Licence granted for exploration stage of project.	DOW – Swan Avon Regional Office to be advised
Department of Mines and Petroleum (DMP)	DMP will require the proponent to submit a Mining Proposal under the <i>Mining Act (1978)</i> . This will include a Mine Closure Plan.	No	DMP – Environment Division to be advised
	Grant of tenure under the <i>Mining Act (1978)</i> for additional Miscellaneous Licences for infrastructure.	Tenure granted.	DMP – Resource Safety Division
	The project will be subject to regulation under the <i>Mines Safety and Inspection Act (1994) and Regulations (1995)</i> in respect to project management, radiation management (RMP) and transport of uranium oxide (TMP).	No	
	Dangerous Goods Licences will be required in accordance with <i>Dangerous Goods Safety Act (2004)</i>	No	
Department of Indigenous Affairs (DIA)	It may be necessary for the proponent to obtain s.18 approvals under the <i>Aboriginal Heritage Act (1972)</i>	No	Minister for Education, Aboriginal Affairs, Electoral Affairs to be advised

Agency/Authority	Approval required	Application lodged Yes / No	Agency/Local Authority contact(s) for proposal
Radiological Council	It will be necessary to comply with the requirements of the <i>Radiation Safety Act (1975)</i> in respect to premise licensing, transport of radioactive materials and Transport Management Plans	No	Radiation Heath Branch – Department of Health to be advised
Shire of Menzies	Building applications and other consents under the <i>Planning and Development Act (2005)</i> and the <i>Health Act (1911)</i> for waste water treatment	No	Chief Executive Officer to be advised
<b>Commonwealth Agencies:</b>			
Australian Radiation Protection and Nuclear Safety Agency	It will also be necessary to obtain approvals under the <i>Radiation Safety Transport of Radioactive Materials (2008)</i> Transport Code.	No	To be advised
Australian Safeguards and Non-Proliferation Office (ANSO), Department of Foreign Affairs and Trade (DFAT)	Permit to establish uranium facility and to possess nuclear material in accordance with Commonwealth Safeguards Act (1987) and Section 6 of the <i>Nuclear Non-Proliferation Safeguards Act (1987)</i> and transport uranium products.	No	ANSO Director General of Safeguards to be advised
Department of Resources, Energy and Tourism (DRET)	Permit to export uranium ore concentrates in accordance with Reg 9 of <i>Customs (Prohibited Exports) Regulations</i> under the <i>Customs Act (1901)</i> .	No	Minister for Resources and Energy to be advised
Department of Sustainability, Environment, Water, Population and Communities (SEWPAC)	Preparation of a Technical Impact Assessment Report in accordance with requirements of the <i>Environmental Protection and Biodiversity Conservation Act (1999)</i> as a nuclear action.	No	Environment Assessment Branch SEWPAC to be advised

## **PART B - ENVIRONMENTAL IMPACTS AND PROPOSED MANAGEMENT**

### **2. ENVIRONMENTAL IMPACTS**

Describe the impacts of the proposal on the following elements of the environment, by answering the questions contained in Sections 2.1-2.11:

- 2.1 flora and vegetation;
- 2.2 fauna;
- 2.3 rivers, creeks, wetlands and estuaries;
- 2.4 significant areas and/ or land features;
- 2.5 coastal zone areas;
- 2.6 marine areas and biota;
- 2.7 water supply and drainage catchments;
- 2.8 pollution;
- 2.9 greenhouse gas emissions;
- 2.10 contamination; and
- 2.11 social surroundings.

These features should be shown on the site plan, where appropriate.

For all information, please indicate:

- (a) the source of the information; and
- (b) the currency of the information.

#### **Baseline Survey Information – Previous and Current**

The Mulga Rock Deposits were discovered and evaluated by PNC Exploration Australia Pty Ltd (**PNC**) during the period 1978-1998. In addition to extensive exploration works, PNC commissioned baseline studies in several key disciplines. Some findings from these earlier studies resulted in the identification of fauna and flora species of limited distribution and potentially high conservation value. A listing of all supporting documentation for this Referral is provided in Table 3 with copies of the Technical Reports in Attachment 2.

**Table 3 Supporting Baseline Documentation**

<b>Reference No.</b>	<b>Technical Reports</b>	<b>Format</b>
1.	Mulga Rock Project – Regional location and access plan	Figure 1
2.	Mulga Rock Project – Project tenure and development envelope	Figure 2
3.	Mulga Rock Project – Conceptual layout plan with disturbance footprint	Figure 3
4.	A Fauna Survey of the Proposed Mulga Rock Project Area, Great Victoria Desert, Western Australia (Ninox Wildlife Consulting, 2010)	Document
5.	Flora and Vegetation Survey of the Mulga Rock Project Area (Mattiske Consulting, 2013)	Document

Reference No.	Technical Reports	Format
6.	Mulga Rock Flora, Fauna and Radioecology Survey (Martinick & Associates, 1986)	Document
7.	Hydrogeology, and Assessment of Dewatering Requirements and Water Supply Sources - Mulga Rock Project (Rockwater, July 2013)	Document
8.	Groundwater Study Lake Minigwal Uranium Prospect (Groundwater Resource Consultants, 1984)	Document
9.	Mulga Rock Prospect Stage 2 Hydrogeological Investigation (Groundwater Resource Consultants, 1985)	Document
10.	Report on Groundwater Exploration at Mulga Rock Prospect, 1985 (Groundwater Resource Consultants, 1986)	Document
11.	Geochemistry, Mineralogy and Hydrogeochemistry of the Ambassador Multi-Element Lignite Deposit, Western Australia. G. B. Douglas, D. J. Grey and C. R. M. Butt CSIRO (March 1993)	Document
12.	Radiation and Occupational Hygiene in the Mulga Rock Project (Radiation Advice & Solutions Pty Ltd, June 2010)	Document
13.	An Archaeological Survey for Aboriginal Sites (S. O'Connor, 1984)	Document
14.	A Survey for Aboriginal sites in the Cundelee Minigwal Area – Interim Report (R. McKeich, April 1982)	Document
15.	A Survey for Aboriginal Sites in the Cundelee Minigwal Area (R. McKeich, August 1982)	Document
16.	EMA Information Sheet (July 2013)	Document

## 2.1 Flora and Vegetation

### 2.1.1 Do you propose to clear any native flora and vegetation as a part of this proposal?

[A proposal to clear native vegetation may require a clearing permit under Part V of the EP Act (Environmental Protection (Clearing of Native Vegetation) Regulations 2004)]. Please contact the Department of Environment and Conservation (DEC) for more information.

(please tick)

Yes

**If yes,** complete the rest of this section.

No

**If no,** go to the next section

### 2.1.2 How much vegetation are you proposing to clear (in hectares)?

The proponent proposes to clear approximately 2,000 hectares over the 15+ years' life of the project. Clearing will be controlled and infrastructure, where feasible, will be located in previously cleared areas.

Preliminary disturbance areas are shown on Figure 3 and these will be further defined when detailed planning and optimisation studies are completed.

2.1.3 Have you submitted an application to clear native vegetation to the DEC (unless you are exempt from such a requirement)?

Yes

No

**If yes**, on what date and to which office was the application submitted of the DEC?

No application to clear native vegetation for project development has been submitted to date although detailed baseline studies to support an application have been undertaken.

2.1.4 Are you aware of any recent flora surveys carried out over the area to be disturbed by this proposal?

Yes

No

**If yes**, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

**See Table 3 – Reference 5.**

**If no**, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

Flora and vegetation surveys were undertaken in the Project Area in 1985 for PNC by Dr Arthur Weston for W. G. Martinick and Associates Pty Ltd (Reference 6) and Mattiske Consulting Pty Ltd in the period December 2007 to September 2010 (reviewed in Reference 5). The 2007-2010 surveys were conducted in accordance with the Environmental Protection Authority Guidance Statement 51 – Level 2 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in WA.

The survey found a total of 41 families, 125 genera and 276 taxa were recorded in the Mulga Rock Project Area between 2007 and 2010. Species representation is greatest among the Fabaceae (47 taxa), Myrtaceae (38 taxa), Goodeniaceae (19 taxa) and Proteaceae (17 taxa) families.

No introduced (weed) species or declared plants (pests) have been recorded within the survey area.

Twenty-two vegetation communities have been recorded within the survey area, comprising twelve Eucalypt woodland-shrub mallee, one Acacia woodland, eight shrublands and one chenopod shrubland. Twelve communities were sampled by permanent plots or relevé mapping sites in this survey with a total of 239 permanent vegetation plots established.

2.1.5 Has a search of DEC records for known occurrences of rare or priority flora or threatened ecological communities been conducted for the site?

Yes

No

If you are proposing to clear native vegetation for any part of your proposal, a search of DEC records of known occurrences of rare or priority flora and threatened ecological communities will be required. Please contact DEC for more information.

Federal and State database searches were undertaken as part of vegetation and flora surveys and reported in Mattiske (2013) – Reference 5.

2.1.6 Are there any known occurrences of rare or priority flora or threatened ecological communities on the site?

Yes

No

**If yes**, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

Mattiske has not identified any Declared Rare Flora pursuant to subsection (2) of Section 23F of the *Wildlife Conservation Act (1950)* and listed by the Department of Parks and Wildlife in Wildlife Conservation (Rare Flora) Notice 2012.

Eleven priority flora species as defined by the Department of Environment and Conservation – Florabase were recorded during the surveys:

- *Hibbertia crispula* (P1 - Vulnerable)
- *Dampiera eriantha* (P1)
- *Malleostemon* sp. Officer Basin (D. Pearson 350) (P2)
- *Styphelia* sp. Great Victoria Desert (N. Murdoch 44) (P2)
- *Labichea eremaea* (P3)
- *Ptilotus blackii* (P3)
- *Conospermum toddii* (P4)
- *Comesperma viscidulum* (P4)
- *Dicrastylis cundeeleensis* (P4)
- *Grevillea secunda* (P4)
- *Olearia arida* (P4)

Four species of flora, including *Labichea eremaea* (P3), *Brunonia ?suffruticosa* ms, *Dampiera ramosa* and *Gastrolobium brevipes* were recorded outside of their currently known distributions. No introduced (weed) species or declared plant (pest) organisms were recorded within the Mulga Rock Project area.

No Threatened Ecological Communities (TECs) as defined by the EPBC Act (1999) or the Department of Environment and Conservation were observed in the survey area.

Data from Mattiske Consulting Pty Ltd surveys suggest that community S6 on yellow sand dunes contains the highest species richness and the highest number of priority flora species, including *Dampiera eriantha* (P1) and *Malleostemon* sp. Officer Basin (D. Pearson 350) (P2) which are only recorded from the yellow sand dunes, as well as *Hibbertia crispula* (P1) which is listed on the EPBC Act as Vulnerable. It is possible that this community will have values that coincide with the broadly defined Priority 3(ii) ecological community, the “yellow sandplain communities of the Great Victoria Desert”. Although this PEC is not well understood and lacks a detailed description, the yellow sand dune community defined in the Mulga Rock Project area extends well beyond the boundary of any currently proposed developments.

Further details are referenced in Reference 5.

2.1.7 If located within the Perth Metropolitan Region, is the proposed development within or adjacent to a listed Bush Forever Site? (You will need to contact the Bush Forever Office, at the Department for Planning and Infrastructure)

Yes

No

N/A

**If yes**, please indicate which Bush Forever Site is affected (site number and name of site where appropriate).

### 2.1.8 What is the condition of the vegetation at the site?

The majority of vegetation within and surrounding the survey area has not been affected by human actions, and as such is deemed to be in Excellent – Pristine condition. Areas affected by recent (<4 years) fires are deemed to be in Good condition – Mattiske (2013) – Reference 5. Other small areas, affected by fires approximately 4-8 years ago, are in Very Good condition. Areas disturbed by fire are evident on Figure 3 as are mechanically disturbed areas such as gridlines and access tracks.

## 2.2 Fauna

### 2.2.1 Do you expect that any fauna or fauna habitat will be impacted by the proposal?

(please tick)

Yes

**If yes**, complete the rest of this section.

No

**If no**, go to the next section.

### 2.2.2 Describe the nature and extent of the expected impact.

#### Terrestrial Vertebrate Fauna

The October 2009 survey undertaken by Ninox Wildlife Consulting recorded 83 terrestrial vertebrate species – 13 native mammals, 3 introduced mammals, 28 birds, no amphibians and 42 reptiles. By comparison, the 1985 survey recorded 58 species composed of 11 mammal, 25 bird, 21 reptile and no amphibian taxa.

#### Fauna Habitats

A brief description of each of the sites chosen for sampling during October 2009 was provided by Mattiske Consulting Pty Ltd. As the DEC had specifically requested that the rare Sandhill Dunnart be targeted during the survey, three sites were chosen specifically because they were where this animal had been captured in 1985 (Martinick & Associates Pty Ltd 1986). These sites are shown as PNC sites. The remaining sites were chosen because they represented the range of plant community types and soil variations present within the current sampling area. Reference 4 lists these sites, their corresponding PNC site codes where relevant, the plant community code with a brief description, and the co-ordinates taken at trap one in each location.

#### Terrestrial Short Range Endemic Fauna

Surveys for terrestrial SREs have not been undertaken and are scheduled for 2014.

#### Subterranean Fauna

A preliminary assessment of project stratigraphy and groundwater quality did not identify optimum habitat for stygofauna. A pilot study has been completed and additional sampling will be undertaken as part of a formal impact assessment. The report is in preparation.

#### Impact to Fauna

Construction and operations may potentially impact on fauna, directly or indirectly, through:

- loss and/or disturbance of vertebrate fauna individuals including Threatened and Vulnerable species, particularly those that lack mobility or enhanced predation from feral animals,
- loss and/or disturbance of vertebrate fauna habitat through clearing;
- secondary impact from vehicle collisions, alteration to surface water flows, potential changes in near mine groundwater levels, uncontrolled fire, noise, dust and light emissions.

2.2.3 Are you aware of any recent fauna surveys carried out over the area to be disturbed by this proposal?

Yes

No

See Table 3–  
item 4.

**If yes**, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

**If no**, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

Detailed fauna assessments have been undertaken in the immediate region of the Mulga Rock Project Area in the past 25 years, associated with studies in Conservation Reserves (Queen Victoria Springs, Plumridge Lakes and Neale Junction), the EPA-assessed Tropicana Gold Project, which includes the Pinjin infrastructure corridor, and in the Mulga Rock Project Area.

Initial studies were undertaken by Dr Ray Hart in mid-1985 as part of the PNC baseline studies reported in Martinick and Associates (1986) – Reference 6. This survey captured eleven of the expected twelve species thought to occur in the region including the Sandhill Dunnart (*Sminthopsis psammophila*) and the incorrectly identified Mulgara (*Dasyercus cristicauda*). Follow-up sampling was undertaken in 2009 by Ninox Wildlife Consulting. Interim survey details and results are reported in Reference 4.

2.2.4 Has a search of DEC records for known occurrences of Specially Protected (threatened) fauna been conducted for the site?

Yes

No

(please tick)

The following database searches were completed as part of the Project Area terrestrial vertebrate fauna survey:

- the DEC Threatened and Priority Fauna database
- Western Australian Museum
- the DEC NatureMap database
- the EPBC Protected Matters Search Tool
- Anabat SZ Specialised Zoological

2.2.5 Are there any known occurrences of Specially Protected (threatened) fauna on the site?

Yes

No

**If yes**, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

The conservation status of significant fauna identified in on-line NatureMap and EPBC Act Protected Matters Reports as potentially occurring in the Project Area and recordings from site surveys are presented in Table 4.



**Table 4 Conservation Status of Significant Fauna that may occur in Project Area**

Species	Conservation Status		Comment
	EPBC Act (1999)	Wildlife Conservation Act (1950)	
<i>Dasyercus blythi</i> (Mulgara)	-	Priority 4	Recorded by Martinick (1986) near airstrip. Not recorded and no signs of their presence found during 2009 survey (Ninox)
<i>Notoryctes typhlops</i> (Marsupial mole)	Endangered	Schedule 1	Not recorded in 1985 or 2009 surveys although evidence of 'mole holes' found in site excavations.
<i>Sminthopsis psammophila</i> (Sandhill Dunnart)	Endangered	Schedule 1	Recorded by Martinick (1986) at two sites in Project Area. Not recorded at same sites in 2009 Ninox survey.
<i>Aspidites ramsayi</i> (Woma)	-	Schedule 4	Recorded in 2008 within Project Area.
<i>Morelia spilota imbricata</i> (Carpet Python)	-	Schedule 4	Not recorded during previous surveys and preferred habitat not found in Project Area.
<i>Liopholis kintorei</i> (Great Desert Skink)	Vulnerable	Schedule 1	Not recorded in previous surveys despite extensive searching (Ninox 2009)
<i>Leipoa ocellata</i> (Malleefowl)	Vulnerable	Schedule 1	Not recorded in previous surveys in the Project Area. Preferred habitat is not present. Recorded outside of Project Area during surveys for Tropicana Gold Project.
<i>Falco peregrinus</i> (Peregrine Falcon)	-	Schedule 4	Not recorded in previous Project Area survey although could be an irregular visitor.
<i>Falco hypoleucos</i> (Grey Falcon)	-	Priority 4	Not recorded in previous Project Area surveys although could be an irregular visitor.
<i>Ardeotis australis</i> (Australian Bustard)	-	Priority 4	Recorded in Martinick (1986) in the Project Area and more recently by EMA exploration personnel.
<i>Ardea ibis</i> (Cattle Egret)	Migratory	Schedule 2	Not recorded and suitable habitat not present.
<i>Burhinus magnirostris</i> (Bush Stone-curlew)	Migratory	Priority 4	Not recorded despite targetted searches within Project Area.
<i>Apus pacificus</i> (Fork-tailed swift)	Migratory		Not recorded in previous surveys and possibly an irregular visitor to the region.
<i>Merops ornatus</i> (Rainbow Bee Eater)	Migratory	Schedule 2	Recorded by Martinick (1986) and Ninox (2010) in Project Area. Common in region.
<i>Pezoporus occidentalis</i> (Night Parrot)	Endangered Migratory	Critically Endangered	Not recorded in previous surveys – may possibly be an irregular visitor. Preferred habitat may not be present in Project Area.

## 2.3 Rivers, Creeks, Wetlands and Estuaries

2.3.1 Will the development occur within 200 metres of a river, creek, wetland or estuary?

(please tick)

Yes

**If yes**, complete the rest of this section.

No

**If no**, go to the next section.

2.3.2 Will the development result in the clearing of vegetation within the 200 metre zone?

Yes

No

**If yes**, please describe the extent of the expected impact.

- 2.3.3 Will the development result in the filling or excavation of a river, creek, wetland or estuary?  
 Yes  No **If yes**, please describe the extent of the expected impact.
- 2.3.4 Will the development result in the impoundment of a river, creek, wetland or estuary?  
 Yes  No **If yes**, please describe the extent of the expected impact.
- 2.3.5 Will the development result in draining to a river, creek, wetland or estuary?  
 Yes  No **If yes**, please describe the extent of the expected impact.
- 2.3.6 Are you aware if the proposal will impact on a river, creek, wetland or estuary (or its buffer) within one of the following categories? (please tick)
- |                                                                                                                                                            |                              |                                        |                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------|---------------------------------|
| Conservation Category Wetland                                                                                                                              | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> Unsure |
| Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998                                                                               | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> Unsure |
| Perth's Bush Forever site                                                                                                                                  | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> Unsure |
| Environmental Protection (Swan & Canning Rivers) Policy 1998                                                                                               | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> Unsure |
| The management area as defined in s4(1) of the <i>Swan River Trust Act 1988</i>                                                                            | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> Unsure |
| Which is subject to an international agreement, because of the importance of the wetland for waterbirds and waterbird habitats (e.g. Ramsar, JAMBA, CAMBA) | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> Unsure |

## 2.4 Significant Areas and/ or Land Features

- 2.4.1 Is the proposed development located within or adjacent to an existing or proposed National Park or Nature Reserve?  
 Yes  No **If yes**, please provide details.
- Two Conservation reserves (Queen Victoria Springs and Plumridge Lakes) occur within 250 kilometres of the Mulga Rock Project Area within the Great Victoria Desert – GVD1 bioregion. The Queen Victoria Springs Nature Reserve is the closest and is located 25 km south of the Project Area. Reserve locations are shown on Figure 1.
- 2.4.2 Are you aware of any Environmentally Sensitive Areas (as declared by the Minister under section 51B of the EP Act) that will be impacted by the proposed development?  
 Yes  No **If yes**, please provide details.
- 2.4.3 Are you aware of any significant natural land features (e.g. caves, ranges etc) that will be impacted by the proposed development?  
 Yes  No **If yes**, please provide details.

## 2.5 Coastal Zone Areas (Coastal Dunes and Beaches)

2.5.1 Will the development occur within 300 metres of a coastal area?

(please tick)

Yes

**If yes**, complete the rest of this section.

No

**If no**, go to the next section.

2.5.2 What is the expected setback of the development from the high tide level and from the primary dune?

Not applicable.

2.5.3 Will the development impact on coastal areas with significant landforms including beach ridge plain, cusped headland, coastal dunes or karst?

Yes

No

**If yes**, please describe the extent of the expected impact.

2.5.4 Is the development likely to impact on mangroves?

Yes

No

**If yes**, please describe the extent of the expected impact.

## 2.6 Marine Areas and Biota

2.6.1 Is the development likely to impact on an area of sensitive benthic communities, such as seagrasses, coral reefs or mangroves?

Yes

No

**If yes**, please describe the extent of the expected impact.

2.6.2 Is the development likely to impact on marine conservation reserves or areas recommended for reservation (as described in *A Representative Marine Reserve System for Western Australia*, CALM, 1994)?

Yes

No

**If yes**, please describe the extent of the expected impact.

2.6.3 Is the development likely to impact on marine areas used extensively for recreation or for commercial fishing activities?

Yes

No

**If yes**, please describe the extent of the expected impact, and provide any written advice from relevant agencies (e.g. Fisheries WA).

## 2.7 Water Supply and Drainage Catchments

2.7.1 Are you in a proclaimed or proposed groundwater or surface water protection area?

(You may need to contact the Department of Water (DoW) for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

Yes

No

**If yes**, please describe what category of area.

Advice was received from the DoW during groundwater licence application (GWL 1790538/1) that the Project Area (which includes the borefield search area) is in the Goldfields Proclaimed Groundwater Area – Combined Fractured Rock West and Alluvium category.

The Project Area is not recorded on the *R/WA (1914)* – Surface Water Proclamation Area (2009).

2.7.2 Are you in an existing or proposed Underground Water Supply and Pollution Control area?

(You may need to contact the DoW for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

Yes  No **If yes**, please describe what category of area.

2.7.3 Are you in a Public Drinking Water Supply Area (PDWSA)?

(You may need to contact the DoW for more information or refer to the DoW website. A proposal to clear vegetation within a PDWSA requires approval from DoW.)

Yes  No **If yes**, please describe what category of area.

2.7.4 Is there sufficient water available for the proposal?

(Please consult with the DoW as to whether approvals are required to source water as you propose. Where necessary, please provide a letter of intent from the DoW)

Yes  No (please tick)

Groundwater search for mine water supply dewatering requirements and identification of potential environmental impact was undertaken by PNC during the period 1980-1985 and reviewed by Groundwater Resource Consultants (1981, 1985) – References 8, 9 and 10. A review of available data, including recent monitoring of historic holes, has been undertaken by Rockwater (2013) –Reference 7. Further groundwater investigation to support project licencing requirements will be undertaken although current studies indicate adequate supplies of suitable quality water are available. The Project currently holds a granted 5C Licence to service the camp and exploration effort.

2.7.5 Will the proposal require drainage of the land?

Yes  No **If yes**, how is the site to be drained and will the drainage be connected to an existing Local Authority or Water Corporation drainage system? Please provide details.

2.7.6 Is there a water requirement for the construction and/ or operation of this proposal?

(please tick)  Yes **If yes**, complete the rest of this section.

No **If no**, go to the next section.

2.7.7 What is the water requirement for the construction and operation of this proposal, in kilolitres per year?

- Water requirement during mining (pre-stripping) and construction < 0.5GL/a
- Water requirement during open pit operations and processing < 2GL/a

2.7.8 What is the proposed source of water for the proposal? (e.g. dam, bore, surface water etc.)

- Groundwater from mine dewatering and production borefield located in the water search area (see Figure 2) north-east of the Ambassador deposit
- Recycled waters from the temporary tailings storage facility when available

## 2.8 Pollution

2.8.1 Is there likely to be any discharge of pollutants from this development, such as noise, vibration, gaseous emissions, dust, liquid effluent, solid waste or other pollutants?

(please tick)

Yes

**If yes**, complete the rest of this section.

No

**If no**, go to the next section.

2.8.2 Is the proposal a prescribed premise, under the Environmental Protection Regulations 1987?

(Refer to the EPA's *General Guide for Referral of Proposals to the EPA under section 38(1) of the EP Act 1986* for more information)

Yes

No

**If yes**, please describe what category of prescribed premise.

Category 5 – Processing and beneficiation of metallic or non-metallic ores

Category 6 – Mine dewatering to allow mining to proceed

Category 89 – Putrescible land fill >20t <5,000 t Type 1, 2 and special wastes

Category 85 – Sewerage facility >20m<sup>3</sup> < 100m<sup>3</sup> day – Village WWTP

Category 67 – Power generation

2.8.3 Will the proposal result in gaseous emissions to air?

Yes

No

**If yes**, please briefly describe.

Gaseous emissions will be derived from vehicles involved in mining activities, power generation at the mine site and radon gas and progeny during mining and processing. In addition to the radiological baseline data obtained by PNC during their trial mining project, further monitoring will be undertaken when formal impact assessment commences.

2.8.4 Have you done any modelling or analysis to demonstrate that air quality standards will be met, including consideration of cumulative impacts from other emission sources?

Yes

No

**If yes**, please briefly describe.

Baseline collection of climatological data from three on-site automatic weather stations will be used for modelling inputs as part of the formal impact assessment process. The project is remote with the nearest sensitive residential populations at Pinjin Homestead 100 km to the west of the project and the Tropicana Gold Project 110 km to the north.

### 2.8.5 Will the proposal result in liquid effluent discharge?

Yes

No

**If yes, please briefly describe the nature, concentrations and receiving environment.**

Liquid effluent discharge will be generated in varying volumes associated with the:

- village wastewater treatment plant and RO bleed
- tailings and other plant and process waters
- contaminated surface waters from plant run-off

No discharges of liquid effluent to the environment are proposed. An appropriately sized waste water treatment plant will be installed to treat domestic waste waters with discharge of waters of appropriate quality to an irrigation area in accordance with DER, Department of Health and Shire of Menzies requirements.

Tailings and process waste water from plant, washdown waters and contaminated surface run-off will initially be disposed in a purpose-built above ground storage covering approximately 23 hectares for an initial two years, followed by storage in the mine void.

#### **Above Ground TSF**

The design concept adopted for the above ground TSF comprises a paddock storage facility / integrated waste landform. The perimeter embankment will be constructed utilising clayey mine waste sourced from the pit as part of the initial mining operations for the project. The perimeter embankment will be a zoned embankment with a compacted upstream zone and a downstream zone constructed utilising traffic compaction or waste dump construction techniques.

In order to reduce seepage from the TSF, a 0.5m thick clay liner has been included in the design concept, which will cover the full basal area of the TSF. No underdrainage system has been incorporated into the design, as tailings deposition will largely be sub-aqueous.

The maximum embankment height will be approximately 7.5m. The perimeter embankment will have design slopes of 1:2.75 (vertical to horizontal) downstream and 1:2 (vertical to horizontal) upstream. The estimated total earthworks volume for the upstream zone of the embankment is approximately 85,000m<sup>3</sup>. This zone will be buttressed with mine waste from the mining operation.

Tailings deposition will be from a slurry ring main around the perimeter embankment crest and will essentially be sub-aqueous in order to reduce the potential for dust generation from the TSF. The design concept also includes allowance for a decant and decant accessway, however it is anticipated that with the high evaporation rates, little water will be returned from the TSF to the plant. Allowance would be made for a decant pump in order to reduce the accumulation of water on the facility following a large/extreme rainfall event.

It is envisaged that closure of the above ground temporary TSF will involve encapsulation of the TSF with waste from pit operations.

#### **In-Pit Disposal**

From a regulatory perspective, the key issues that the Department of Mines and Petroleum (DMP) will consider for in-pit storage of tailings are:

- i) Presence of mineralisation in the base of the pit. Mining of the sandstone at the pit base is not contemplated, however in-situ leach of mineralisation of sandstone within the Ambassador Project area is being considered as a separate project.
- ii) Presence of a groundwater resource. Based on a review of the hydrogeological information, there is no potable or stockwater resource near the mining area.

A hydrogeological assessment specific to in-pit tailings storage and including recommendations on the location and depth of the monitoring / recovery bores will be undertaken as part of impact assessment studies.

- iii) Geochemical and radiological characteristics of the tailings.
- iv) Operational aspects.
- v) The need for the final surface of tailings deposition to finish either 5m above the natural water table or 5m below the natural water table.

Hydrogeology reports, (Reference 4 and Reference 7) were reviewed as part of the in-pit tailings assessment, and the following was noted:

- The groundwater level at the Princess and Ambassador deposits varies between 27-48m bgl with groundwater flow to the south.
- The water is saline to hypersaline with a TDS around 20,000 to 37,000mg/l TDS. The water is moderately acidic to neutral with pH ranging from 3.5 to 6.8.
- Preliminary hydrogeology modelling assumed dewatering by in-pit drains and sumps, however, some depressurisation of sand beds will probably be needed using dewatering bores to prevent floor heave, and this will add to the quantities being pumped.
- The transmissivity of the pit base was assessed to be 8-9m/day. The base of the pit will be of medium permeability.
- Groundwater Resource Consultants concluded that tailings could be disposed of in the mined out pits, without detrimental effect on the groundwater, which is saline to hypersaline, acidic and radioactive – GRC (1984) – Reference 8.

### **Evaporation Pond**

The evaporation pond will be approximately 55 hectares in area and will be located immediately north-west of the plant site in a 'swale' area between several sand dunes.

The evaporation pond has been sized utilising water balance analysis. Inflows and outflows for the facility were estimated on a monthly basis. Inflows include plant water to be disposed of and incident rainfall. Outflows comprise evaporation losses and seepage losses. Water within the evaporation pond facility will potentially accumulate over the project life although this is dependent on the option of reinjecting excess groundwater into palaeo-aquifers. This aspect will be considered as part of impact assessment.

The following assumptions were adopted in the analyses:

- An average annual rainfall of 250mm (i.e. similar to Kalgoorlie).
- An average annual evaporation rate of 3,000mm (i.e. based on published data Department of Agriculture, WA (1988)).
- An evaporation pan factor of 0.75.
- The facility will be unlined and downward seepage is acceptable. Basal permeability  $10^{-5}$ m/s assuming a foundation of silty sand.

The facility will be formed by a low perimeter homogeneous embankment. The embankment will be constructed using compacted clayey mine waste sourced from the West Pit. The embankment foundation will require preparation and a seepage cut-off trench may be required. It has been assumed that the facility will not be clay lined in order to reduce the pond footprint.

The evaporation pond will contain a storage volume of 1,200,000m<sup>3</sup> plus allowance for 1.0m freeboard. The 1.0m freeboard allowance comprises 0.2m of storm freeboard (1:100 year 72 hour event), 0.3m allowance for waves and 0.5m for operational freeboard.

The maximum embankment height will be approximately 3m. The perimeter embankment will have design slopes of 1:2 (vertical to horizontal) downstream and upstream. The estimated total earthworks volume for the final embankment is approximately 110,000m<sup>3</sup>.

It should be noted that no physical or geochemical tailings testwork or geotechnical investigations have been performed as part of conceptual design studies and as such, the tailings storage / evaporation conceptual design work has been performed based on assumed parameters for the region. Waste characterisation testwork will be undertaken as part of impact assessment studies.

- 2.8.6 If there is likely to be discharges to a watercourse or marine environment, has any analysis been done to demonstrate that the State Water Quality Management Strategy or other appropriate standards will be able to be met?

Yes

No

**If yes**, please describe.

- 2.8.7 Will the proposal produce or result in solid wastes?

Yes

No

**If yes**, please briefly describe the nature, concentrations and disposal location/ method.

Solid wastes will be produced during construction, mining, processing and putrescible wastes associated with the village. Some waste materials will be radioactive and require specialised management. These aspects will be covered through a regulatory approved Radiation Management Plan.

Construction wastes will be assessed for recycling and reused or disposed in a site landfill. The landfill will be of a Prescribed Category and subject to DEC Licencing under Part V of the *EP Act 1986*.

Management of tailings has been discussed in section 2.8.5.

#### **Mine Waste Materials**

Mine waste materials will consist of benign (non-radioactive) material and below ore grade material from mineralised zones.

A waste rock disposal strategy will be developed as part of final mine design studies although initial mine waste materials will be disposed in an engineered structure in close proximity to the pit. In-pit dumping will be employed, as far as is practicable, to minimise out of pit dumping and rehabilitation requirements. Tailings should, as far as is practicable, be placed back into the voids left by the mining operations, capped with suitable waste material, and rehabilitated. Any potentially acid forming (PAF) material generated as a result of mining operations would be encased in lined compartments within in-pit or out-of-pit waste dumps.

- 2.8.8 Will the proposal result in significant off-site noise emissions?

Yes

No

**If yes**, please briefly describe.

Noise emissions will be generated as a result of mining activities, materials handling, and crushing and transport. Sensitive receptors include human and faunal populations. Given the exclusion distance to the nearest sensitive residential area, off-site noise impacts are considered low risk. Studies will be undertaken during the impact assessment process to assess potential impacts.



- 2.8.9 Will the development be subject to the Environmental Protection (Noise) Regulations 1997?
- Yes                       No                      **If yes**, has any analysis been carried out to demonstrate that the proposal will comply with the Regulations?  
Please attach the analysis.

The project is located in a remote area and no external sensitive receptors have been identified. Any required analysis will be undertaken during the environmental assessment of the project. Noise levels in the village will comply with the relevant assigned noise levels in the *Environmental Protection (Noise) Regulations (1997)*.

- 2.8.10 Does the proposal have the potential to generate off-site, air quality impacts, dust, odour or another pollutant that may affect the amenity of residents and other “sensitive premises” such as schools and hospitals (proposals in this category may include intensive agriculture, aquaculture, marinas, mines and quarries etc.)?

Yes                       No                      **If yes**, please describe and provide the distance to residences and other “sensitive premises”.

- 2.8.11 If the proposal has a residential component or involves “sensitive premises”, is it located near a land use that may discharge a pollutant?

Yes                       No                      **If yes**, please describe and provide the distance to the potential pollution source

Emission modelling will be undertaken as part of impact assessment to identify appropriate siting of the village.

## 2.9 Greenhouse Gas Emissions

- 2.9.1 Is this proposal likely to result in substantial greenhouse gas emissions (greater than 100 000 tonnes per annum of carbon dioxide equivalent emissions)?

Yes                       No                      **If yes**, please provide an estimate of the annual gross emissions in absolute and in carbon dioxide equivalent figures.

- 2.9.2 Further, if yes, please describe proposed measures to minimise emissions, and any sink enhancement actions proposed to offset emissions.

Further studies in accordance with EPA Guidance Statement 12 will be undertaken when mining fleet details are known. Preliminary estimates based on an annual fuel burn of 5,000 t report greenhouse gas emissions of approximately 13,500 tonnes.

## 2.10 Contamination

- 2.10.1 Has the property on which the proposal is to be located been used in the past for activities which may have caused soil or groundwater contamination?

Yes                       No                       Unsure                      **If yes**, please describe.

2.10.2 Has any assessment been done for soil or groundwater contamination on the site?

Yes  No **If yes, please describe.**

The groundwater contains a range of natural elements, some at elevated concentrations, and these have been identified by detailed geochemical testing by CSIRO (1993) - Reference 11. No anthropogenic contamination is recorded.

2.10.3 Has the site been registered as a contaminated site under the *Contaminated Sites Act 2003*? (on finalisation of the CS Regulations and proclamation of the CS Act)

Yes  No **If yes, please describe.**

## 2.11 Social Surroundings

2.11.1 Is the proposal on a property which contains or is near a site of Aboriginal ethnographic or archaeological significance that may be disturbed?

Yes  No **If yes, please describe.**

Field heritage surveys were undertaken by PNC covering selected parts of the Project Area tenure in 1984 and 1986. While no ethnographic sites were identified in the Project Area – References 14 and 15 – and several archaeological sites were located – Reference 13 – and the details lodged on the Aboriginal Site Register.

EMA has maintained contact with local communities and further ethnographic and archaeological surveys will be undertaken in those sections of the Project Area, such as the water search tenure, to ensure all heritage sites are identified.

No archaeologically significant sites are expected to be disturbed – if any are identified they will be dealt with under s.18 of *Aboriginal Heritage Act*.

2.11.2 Is the proposal on a property which contains or is near a site of high public interest (e.g. a major recreation area or natural scenic feature)?

Yes  No **If yes, please describe.**

2.11.3 Will the proposal result in or require substantial transport of goods, which may affect the amenity of the local area?

Yes  No **If yes, please describe.**

The transport of uranium oxide concentrate (UOC) would be conducted in accordance with the Radiation Safety Act 1975 (WA) and the Radiation Safety (Transport of Radioactive Substances) Regulations 2002 (WA) and national and international Codes of Practice.

The uranium oxide concentrate produced at Mulga Rock would be packed in steel drums and transported in conventional shipping containers via private and nominated public roads and rail systems. Along with the Western Australian state approvals for the transport of radioactive substances, transport permits and the transport route would be subject to approval by the Australian Safeguards and Non-Proliferation Office.

Transport options, routes, and ports are being evaluated as part of permitting studies and will be described in Transport Management Plans as part of the Environmental assessment process. Only two ports in Australia are approved for uranium export and for this reason all uranium produced in Australia is shipped through Port Adelaide or the port of Darwin.

Preliminary risk assessment has identified transport by Shire roads, the Goldfields Highway Bypass, Eyre Highway and Princess Highway or a road/rail combination as the preferred solution with shipment through Port Adelaide or the Port of Darwin.

### 3. PROPOSED MANAGEMENT

#### 3.1 Principles of Environmental Protection

3.1.1 Have you considered how your project gives attention to the following Principles, as set out in section 4A of the EP Act? (For information on the Principles of Environmental Protection, please see EPA Position Statement No. 7, available on the EPA website)

1. The precautionary principle.  Yes  No
2. The principle of intergenerational equity.  Yes  No
3. The principle of the conservation of biological diversity and ecological integrity.  Yes  No
4. Principles relating to improved valuation, pricing and incentive mechanisms.  Yes  No
5. The principle of waste minimisation.  Yes  No

Road transport volumes would increase during the construction phase then reduce.

3.1.2 Is the proposal consistent with the EPA's Environmental Protection Bulletins/Position Statements and Environmental Assessment Guidelines/Guidance Statements (available on the EPA website)?

- Yes  No

#### 3.2 Consultation

3.2.1 Has public consultation taken place (such as with other government agencies, community groups or neighbours), or is it intended that consultation shall take place?

- Yes  No **If yes**, please list those consulted and attach comments or summarise response on a separate sheet.

EMA has adopted a proactive stance in respect to engagement and consultation with stakeholders. This has involved providing presentations to local government, business associations in the Goldfields, at industry conferences and to regulatory agencies and communities. A sample of the consultation register is provided below. EMA is committed to maintaining effective and beneficial consultation with area stakeholders. A recent information sheet is shown in Reference 16.

List of consultation undertaken to date is shown below in Table 5. Further consultation will be undertaken as project details are known.

**Table 5 Public Consultation**

*CEO = Chief Executive Officer, EC = Environmental Consultant, GME = General Manager, Exploration, ED = Executive Director, CFO = Chief Financial Officer, RC = Radiation Consultant*

Date	Stakeholder	Topic	By
28 May 2008	Briefing to Boardroom Radio	Introduction to Mulga Rock Project and IPO	CEO
19 June 2008	Mark Sonter, Radiation Consultant, training staff/contractors	Radiation and OH&S. Handling and transport of exploration materials	RC

Date	Stakeholder	Topic	By
15 Sept 2008	Interview with WIN Television News	Introduction to Mulga Rock Project	CEO
Oct 2008	What's Down the Track? Conference in Kalgoorlie	To provide the business and wider community with a practical perspective of planned activities within the Goldfields–Esperance region over the next 1 to 3 years	CEO
2 Oct 2008	ABC TV filming at Mulga Rock and interview for Stateline programme – general public audience	Introduction to Mulga Rock Project	GME
6 Oct 2008	Interview with Kalgoorlie Miner	Introduction to Mulga Rock Project	CEO
Oct 2008	Presentation to President, CEO and council members - Shire of Menzies	“Menzies Shire and Mulga Rock – Partners in prosperity”	CEO, EC
18 Nov 2008	Radio interviews with ABC Regional Radio	Introduction to Mulga Rock Project	CEO
3 Feb 2009	Meeting with AngloGold Ashanti Manager	General update - Tropicana Gold Mine – road use	CEO, EC, ED
17 Feb 2009	Presentation to RIU Explorers Conference – also booth at conference – satchel handouts, flyers	Mulga Rock: Timing is everything	CEO
16 April 2009	Meeting with Barry Haase, Federal Liberal member for Kalgoorlie/Durack	Mulga Rock Project Update	CEO
7 May 2009	Menzies Shire/ Red Ochre	Presentation and community workshop for companies doing business in the Menzies Shire	CEO
29 June 2009	Central Desert Native Title Service	East Wongatha community briefing at Central Desert Native Title Services	CEO, EC
31 July 2009	Meeting with Nicole Hinton, Acting Manager, Uranium Industry Section, Department of Resources, Energy and Tourism Linda Tindall-Mather, Assistant Manager, Uranium Industry Section, Department of Resources, Energy and Tourism Lachlan Wilkinson CEnvP, Assistant Director, Mining Section, Environment Assessment Branch, Department of Environment, Water Heritage & the Arts Craig Everton, Acting Manager, Nuclear Accountancy and Control Section, Australian Safeguards and Non-proliferation Office DFAT	Mulga Rock Project update – project description <ul style="list-style-type: none"> <li>▪ identification of permitting routes and referrals</li> <li>▪ threatened fauna</li> <li>▪ DRF regional studies</li> </ul>	CEO, EC
19 Aug 2009	Meeting with Paul Frewer (Director, Chamber of Minerals and Energy) in Kalgoorlie Presentation to Kalgoorlie community at Uranium event held at WASM Conference Centre	Mulga Rock Project Update	CEO
9 Sept 2009	Meeting at Railway Motel, Kalgoorlie with Central Desert Native Title Services and East Wongatha community	Briefing on company direction and project studies and timeframes	CEO, EC, CEO NT
9 Sept 2009	Presentation to Jim Boucault, Mining Inspectorate Kalgoorlie, David Watson, Mining Inspector, Mining Field 39, Occupational Health Inspector, various other department personnel	Mulga Rock Project Update, OH&S management	CEO, EC
27 Nov 2009	Consultation in Kalgoorlie at Threatened Species meeting hosted by DEC	Presentation on progress with DRF studies	EC

Date	Stakeholder	Topic	By
3 Dec 2009	Progress report to Daniel Coffey (DEC), Sandra Thomas (DEC EMB Goldfields Coordinator), Norm Caporn (EMB Manager), and David Pickles (phoning in from Kalgoorlie as DEC's Goldfields Regional Coordinator).	Mulga Rock Project Progress Update <ul style="list-style-type: none"> <li>review of progress with baseline studies</li> </ul>	CEO, EC
7 Dec 2009	Progress report to Commonwealth DEWHA, Canberra Tim Kahn, Director, Mining Section Neisha Burton and Kate Smith, Assessment Officers, Mining Section Linda Tindall-Mather - Assistant Manager, Uranium Section, Department of Resources, Energy and Tourism Nitin Srivastava - also from Uranium Section	Mulga Rock Project Progress Update	CEO, EC
16 Dec 2009	Meeting with Kevin Seaton, Agriculture Department - Perth	Scope, timelines and costings for germination studies	CEO, EC
4 Jan 2010	Briefing with Ian Loftus, Project Approval Co-ordinator, Dept Mines and Petroleum	Mulga Rock project update	CEO, EC
4 March 2010	Over the Horizon Forum – Esperance Marcus Tromp, Chief Executive Officer, Esperance Chamber of Commerce & Industry	Mulga Rock Project and effect on Esperance community	CEO
16 March 2010	Leonora community members – Group Public Meeting – Leonora Shire Council	CME Uranium Forum	CEO
17 March 2010	Menzies Shire community members - Group Public Meeting – Menzies Town Hall	CME Uranium Forum	CEO
28 July 2010	Meeting with Department of Indigenous Affairs – Jo Franz	Access to document “A Survey for Aboriginal Sites in the Cundeelee Minigwal Area”	CEO, EC
20 Aug 2010	Department of Water – Swan Avon management team and technical personnel	Briefing re Mulga Rock Project - Rockwater provided overview of project groundwater studies, ISL	CEO, EC, Rockwater
23 Sept 2010	Kalgoorlie-Esperance community	What’s Down the Track in Kalgoorlie? “to provide the business and wider community with a practical perspective of current and planned activities within the Goldfields-Esperance region”	CEO
Oct 2010	Presentation to Department of Environment and Conservation: Mr Gordon Wyre, Director of Nature Conservation Dr David Coates, A/Director of Science Mr Daniel Coffey, A/Principal Environmental Coordinator – EIA, Environmental Management Branch Ms Sandra Thomas, Environmental Project Officer – EIA , Environmental Management Branch Ms Liesl Rohl, Principal Environmental Officer – Assessment, Native Vegetation Conservation Branch	The Mulga Rock Project – details from the recent scoping study and future directions and completion of DRF helicopter survey	CEO, EC, Libby Matiske
4 Nov 2010	Meeting with Barry Haase (Federal Member for Durack) and Dr Dennis Jensen (Federal Member for Tangney)	Project update re Mulga Rock, its importance to the Kalgoorlie region and the growing uranium industry in WA	CEO

Date	Stakeholder	Topic	By
15 Dec 2010	Meeting with Lachlan Wilkinson, Federal Dept of Environment, Assistant Director Mining Section	Mulga Rock Project update	CEO, EC
15 Dec 2010	Presentation to Ian Lambert, Group Leader, Geoscience Australia	Mulga Rock Project update	CEO, EC
12 Jan 2011	Meeting with Mia Pepper, Conservation Council of Western Australia	Mulga Rock Project update and site visit	CEO, EC
31 Jan 2011	Mark Sonter, Radiation Consultant at Mulga Rock – training and audit	Review: - site radiation procedures - equipment calibration - site facilities + Toolbox/mentoring session with ED for site personnel – general radiation protection and induction + Detailed site inspection/audit of at least 30% of recent drilling, sample disposal sites and sample storage sites + Discussion and planning of upgrade to sample storage area in view of planned licence application and field leach trial requirements	CEO, EC, ED, GME
2 Feb 2011	Meeting with Trevor Jones, Regional Mine Inspector, Department of Mines and Petroleum, Kalgoorlie	Mulga Rock overview, flora and fauna, stakeholders (communities and indigenous), transport, work programmes	CEO, EC
9 Feb 2011	Meeting with WA EPA (Dr Paul Vogel, Chairman)	Project update	CEO, EC
1 June 2011	WA DMP	Site visit with DMP representative	EC, GME
19 July 2012	Uranium Conference, Fremantle (RIU)	Company and project update	GME
3 Aug 2012	WA DMP (R. Sellers, T Griffin, I. Roberts, P. Gorey), Kalgoorlie Inspectorate	Project update and site inspection, permitting	CFO, GME, EC
14 Dec 2012	WA DEC, Kalgoorlie (Julie Futter)	Project update - exploration	GME, EC
14 Dec 2012	WA DMP, Kalgoorlie (Nick Galton-Fenzi, Daniel Endacott)	Project update	GME, EC
14 Dec 2012	Joe Benshemeh	Discuss Marsupial Mole surveying strategy	GME, EC
19 April 2013	AusIMM International Uranium Conference, Darwin	Attend conference and presentation	GME, ED
16, 17 July 2013	Australian Uranium and Rare Earths Conference, Fremantle	Presentation, stand and attendance at conference – one page information sheet	CEO, GME, ED